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### SUBSTITUTE SPECIFICATION

[0001] WOOD WALL CONSTRUCTION MADE OF WOODEN BEAMS

[0002] BACKGROUND

[0003] The invention relates to a wood wall construction made of wooden beams, wherein said wooden beams are superposed and possibly juxtaposed and assembled with screws, which are screwed into the mutual attachment area of two wooden beams in a bridging manner from the top or the bottom of the two wooden beams and which extend only over a part of the height or the thickness of each wooden beam.

[0004] When building such a wood wall construction made from wooden beams, the wooden beams stacked on top of one another are connected to each other, with the problem of course being the fact that the screws do not ensure a positive durable connection due to the volume changes caused by shrinkage and swelling. The publication of the utility patent DE 299 20 853 U1, from which a wood wall construction of the type mentioned at the outset is known, provides for the elimination of the above-mentioned problem in that each screw is provided with a spring below the head, which is to create a permanent pressure by the thread of the screw being screwed-in and counter sunken and thus provides for an absolute firmness of the wall made from beams. At least due to this spring, each screw hole must be pre-drilled for accepting said spring in this known wood wall construction.

[0005] Another known embodiment (EP-0787866B1) provides for machine screws to be inserted into pre-drilled holes adjusted to a stack of wooden beams each, with the screws being in a positive connection to one another by the head of the screws being provided with threaded holes, into which the end of the shaft of the subsequent screw, provided with a thread, can be screwed-in. In this manner, a type of a continuous fastening rod is formed, with the head of each individual screw being supported at the upper side of a wooden beam respectively.

[0006] From DE 198 28 275 A1 a wooden beam for building wooden houses is known. When two such wooden beams are positioned on top of one another and connected by screws, a hole is predrilled for each screw, which extends entirely through the upper beam in the form of a penetrating hole so that the thread of the screw engages the lower beam only.

[0007] A carrier made from wood is known from DE 100 13 810 A1, having sections subject to lateral stress. Such sections particularly act in the area of cut-outs or penetrations of the carrier. In order to compensate the lateral stress, rod-shaped elements are provided which are formed by screws, which are inserted, and extend perpendicularly to the longitudinal direction of the carrier. These screws are screwed-in from the top or from the bottom of the carrier and each run over a part of the height of the carrier only and thus they are immediately allocated to the lateral tension of the loaded zone. This state of prior art is therefore relevant for a single wooden beam only, however not with regard to its connection to other wooden beams.

[0008] From the publication of the German utility patent DE 93 07 029 U1 it is known to connect exterior wall beams by way of cross-nailing.

[0009] SUMMARY

[0010] The present invention is to attain the objective of providing a wood wall construction with the use of screws, which can be produced fast and simple and in which an optimum assembly of the wooden beams stacked on top of one another can occur.

[0011] According to the invention this is achieved in that the wooden beams are connected to one another by screws provided with threaded sections at least at their two end sections, which are screwed-in without pre-drilling and which extend only over a part of the height or the thickness of the wooden beam and therefore only engage the immediate attachment area of the two wooden beams, with the length of the screws being provided shorter than the height of the wooden beam.

[0012] According to the invention, the screws engage only the immediate attachment areas of the two wooden beams and are screwed-in without pre-drilling. Much shorter screws are necessary only, which can also be counter sunken particularly deep. Due to the considerably shorter screws to be inserted a particular saving in material and expenses can be achieved. Additionally, by the considerably shorter shaft having a thread, the screwing-in torque can be considerably reduced in reference to a long screw. Due to the considerably shorter dimensions of the screws inserted according to the invention a much faster and shorter assembly time is achieved as well. The production of a wood wall construction is therefore considerably easier and faster by the measures according to the invention. In particular, it is ensured in this manner that the connection maintains its effectiveness even during the changes in volume occurring due to shrinkage and swelling of the wood parts to be attached. The connection remains stiff even after repeated shrinkages and swellings of the wooden beam.

[0013] In this context it is advantageous for the screws to extend approximately to the same extent into the wooden beams contacting one another at both sides of the mutual contact area. Therefore, sufficient mutual fastening of two wooden beams positioned on top of one another is ensured at all times. The screws are anchored in the same manner in both wooden beams.

[0014] The easiest way of a mutual connection of wooden beams comprises that two screws each are screwed into two wooden beams, with the screws being aligned approximately parallel to one another and spaced apart from each other.

[0015] A construction variant provides for the screws to be provided with threads over the entire length of its shaft. This can be advantageous for production-technological reasons. The transfer of tensile forces can be improved by a longer engagement of the threads as well.

[0016] Further, it is provided that the screws are provided with an interior tool grip at one end, with the diameter of the section of the screws surrounding said interior tool grip being approximately equal in size or only slightly larger than the outside diameter of the thread. This way it has been possible without any

particular increase of the screwing-in torque to insert the screws without any pre-drilling into a hole to such a depth, that the screws engage only the immediate mutual contacting area of the two wooden beams.

[0017] The type of mutual connection of wooden beams according to the invention for building a wood wall construction additionally allows the simple sealing of the mutual attachment area between two wooden beams. For this reason it is also provided that the screws are inserted between sealing material strips arranged or inserted between the edge regions of the mutual contact areas of the wooden beams.

[0018] One embodiment provides that the screws are screwed-in perpendicularly to the longitudinal extension of the wooden beams. This also defines the shortest screwing-in length.

[0019] Another possibility is provided when the screws are screwed-in at an acute angle in reference to the longitudinal extension of the wooden beams. This way, even higher tensile or pressure forces can be compensated at the mutual attachment. The shearing forces to be compensated, i.e. the forces acting in the horizontal direction, can be sized considerably higher.

[0020] In this context it can be advantageous for the screws to be screwed-in both perpendicular as well as at an acute angle in reference to the longitudinal extension of the wooden beams, perhaps subsequently alternating. Thus, depending on the required compensation of forces an optimum solution can be chosen.

[0021] Here, an additional possibility is provided in the screws each being screwed-in in pairs, crossing one another at an acute angle in reference to the longitudinal extension of the wooden beam or perpendicular thereto. Here, it is certainly possible that the screws that are screwed-in crossing one another are positioned at an acute angle in reference to the vertical central plane of the vertical planes of the wall construction made from wooden beams.

[0022] BRIEF DESCRIPTION OF THE DRAWINGS

[0023] In the following, exemplary embodiments according to the invention are explained in greater detail using the drawing. Shown are:

[0024] Fig. 1 through Fig. 3 Vertical cross-sections through wooden beams stacked on top of one another having various cross-sectional forms, which are attached to one another via screws;

[0025] Fig. 4 through Fig. 6 Side views of a wood wall construction formed by wooden beams, in which the screws are screwed-in by different manners.

[0026] DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0027] In the wood wall construction made from wooden beams shown, wooden beams 1 are stacked on top of one another and the subsequent following wooden beams 1 are connected to one another by screws 2. Here, the wooden beams 1 are connected to one another by screws 2 provided at least at their end regions with threaded sections 3 and 4. These screws 2 are screwed in from the top or the bottom side of the wooden beam 1, without pre-drilling, bridging the mutual attachment area of two wooden beams 1, and extend over a part A of the height or thickness B of the wooden beam 1. Therefore, the screws 2 are only allocated to the immediate mutual attachment area 5 of two wooden beams 1.

[0028] The screws are screwed-in without any pre-drilling, so that a considerable shortening of the assembly time results. The screws 2 can be provided with a threaded section 3 and 4 in the area of their two ends only. However, it is also possible to provide a continuous thread over the entire length of the shaft. Within the scope of the invention, various thread forms, various thread leads, and various ratios between the diameter of the root of the thread and the outside thread diameter are possible. The construction and function of the drilling and/or insertion tip to be provided at one free end can be carried out in different manners. The form of a screw head is variable, too, however, it must be provided such that it can easily be mounted within the wooden beam into a deeply counter sunk position. It is also possible that two threaded sections are provided with different thread leads. Although the screwing-in torque is considerably increased thereby when screwing

into the first wooden beam 1, during the engagement of the screw 2 into the two stacked wooden beams 1 this allows the beams to be pulled against each other, in order to increase the mutual pressure. Of course, a surface coating of the screws used here is also advantageous. In particular, a coating is suitable, which lowers the screwing torque of the screws 2. Such coating can be applied in addition to corrosion protective coating or the corrosion protective coating can simultaneously cause an effect reducing the installation torque.

[0029] The screws 2 extend almost equally far into the mutually contacting wooden beams 1 on both sides of the mutual attachment area 5. The length C of the screws 2 is provided smaller than the height B of the wooden beams 1.

[0030] In the mutual attachment area 5 of two wooden beams 1, two or more than two screws 2 are each screwed-in spaced apart from one another, and aligned almost parallel to one another.

[0031] Here, there is the possibility to perpendicularly screw-in the screws 2 in reference to the longitudinal extension of the wooden beams 1 or at an acute angle in reference to the longitudinal extension of the wooden beams 1 (see Figs. 5 and 6). Depending on the requirements of the mutual extension of the wooden beams 1, the most beneficial type of connection can be selected. Therefore, it is also possible to screw-in the screws 2 either perpendicular or at an acute angle in reference to the longitudinal extension of the wooden beams 1, perhaps subsequently alternating. Further, a variant provides for the screws 2 to be screwed-in in pairs with each being at an acute angle in reference to the longitudinal extension of the wooden beams 1.

[0032] The screws 2 are provided with an interior tool grip 6 at one of their ends, with the diameter of the section of the screws 2 surrounding the interior tool grip 6 being provided with an approximately equal or slightly larger size than an outside diameter of the thread.

[0033] The screws 2 can be screwed-in with a screw driver bit, with its shaft adjacent to the engaging section for contacting the screw 2 or a virtual cylindrical shell of the shaft having a diameter equal or slightly smaller than the diameter of the section of the screw 2 surrounding the interior tool grip 6. Further, this shaft has a length for covering the distance of the height B of the wooden beam 1 from the interior tool grip 6 of the screw 2 to the upper or lower limit and further to the screw insert. This way, an orderly drive of the screws to a final position can be achieved, without any additional torque enhancement being caused by the screwing tool.

[0034] When strip-shaped sealing material 7 is used, the screws 2 are arranged between the edge regions of the mutual attachment areas 5 of the sealing material 7 inserted between the wooden beams 1.

[0035] The cross-sectional shape of the wooden beams during the use of the measures according to the invention can be designed in multiple ways. For example, wood wall constructions can also be made from wood beams in the shapes naturally formed. Wooden beams 1 sawed into different cross-sectional shapes can also be used with or without mutual tongue-and groove formations.

[0036] In Fig. 1, three bores 8 are discernible, which have been made by screwing-in the screws 2. Similar bores 8 are discernible in Figs. 2 and 3. According to the representation in Figs. 2 and 3, the bores 8 would appear to be arranged over top of one another; however, the bores 8 of one beam are actually offset in reference to the bores 8 of the subsequent beam by a certain distance, as discernible from Figs. 4-6.